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THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE, TRINIDAD, B.W.I.

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TROPICAL AGRICULTURE is published a the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies, at the end of the third week of the month preceding the one of issue. Advertisement rates can be obtained at the College from the Editor, or from the Secretary of the College, 14, Trinity Square, London, E. C. 3, England. The Editor will be glad to consider authoritative articles for publication. It is understood that opinions expressed in signed articles are those of the author and do not necessarily represent the policy or opinion of the College Authorities. Increasing numbers of inquiries are being received from various parts of the tropics which can be answered only by persons possessed of an intimate knowledge of local conditions. Enquirers should first satisfy themselves that their local Department of Agriculture is not able to supply them with the desired information before communicating with us. Correspondence which will be replied to is invited on all other matters pertaining to tropical agriculture, science and development.

TROPICAL HYGIENE.

Its Economic Application.

THE College has received a recent addition to its staff in Dr. E. A. Seagar, who reported his arrival in Trinidad on November 30th last. This appointment is due to the generosity of the International Health Board of the Rockefeller Foundation, and Dr. Seagar has reached Trinidad after a period of four months travel in the United States, during which period he has seen the work of the numerous branches of that wide-spread Institution. The appointment is significant in more senses than one.

Opinions differ as to the suitability of the Tropics for the permanent residence of the white man. Such authorities as Professor Patrick Geddes and Surgeon-Colonel Gorgas appear to hold that the main drawback to colonization in the past has been disease and that recent discoveries have largely eliminated and will, in the future, still further eliminate, the sources of disease. This evidence is based mainly on experience gained by the application of recent practice especially in Panama, the Philippines and Cuba. This experience, however, is that of little more than a generation and it may be questioned whether it covers the entire problem. There exists an equally weighty opinion, supported by authorities like Sir Havelock Charles and Huntington, which maintains that tropical residence is ultimately a question of light, heat and humidity and that the nervous aspect cannot be disregarded. Freedom from disease may render the tropics habitable to the individual but when the second and third generation is in question the tale may be very different.

We need not, however, stay to sound the merits of these diverse opinions ; the development of the tropics is, and will be for some time to come, a question of the health of the individual white man, and there is not the slightest doubt that enormous strides have been made in recent years in the direction of maintaining the health of those whose work imposes on them a tropical residence. In the brief life of this Journal, emphasis has frequently been laid on the importance of tropical development to world welfare and on more than one occasion the lines of that development have been indicated. Capital must develop the lines of communication, capital must organise production if foreign markets are to be satisfied, and such capital must come from without. Now capital requires supervision, and development inevitably means a community of those whose business it is to supervise. There

is, thus, an increasing body of white men and families residing under tropical conditions on whose health the efficiency of the development ultimately depends. The days and the system so realistically portrayed in the play "White Cargo" are fortunately rapidly becoming a thing of the past.

From another aspect production depends on the efficiency of indigenous labour and this again, is a question of health. The terrible ravages of certain diseases, of which we may instance yellow fever, now fortunately almost a peril of the past, sleeping sickness, controlled by the tsetse fly and limited to the range of that insect, hookworm and malaria are well known and their effect in reducing the efficiency of the real producing element of the population are now well known. The most widely distributed of these is malaria which, in the aggregate, reduces enormously the efficiency of tropical labour. The study of these and their remedies have made the work of control almost spectacular. Less spectacular, but probably in the aggregate as important, is the work on general hygiene and sanitation under tropical conditions which has in recent years led to much care and forethought in the location, design and maintenance of quarters for labour. On estates and in the areas controlled by development syndicates attention to these points is now an essential feature and it is important that all persons entering the employment of such bodies should understand the fundamental principles underlying measures for the care of labour, as well as be in a position to make rough and ready diagnosis and to take early steps to check an outbreak. Through the generosity of the International Health Board of the Rockefeller Foundation, every student who passes through this College will now be in a position to acquire this knowledge.

There is another aspect arising out of this appointment. Nationalism is giving place to Internationalism as the world diminishes in size, and the routes by which this change is progressing are various. Not the least of these is that internationalism which, proceeding by gradual stages, finds its basis in the general welfare and progress of the human race. The gift to an Imperial and British Institution, such as is this College, of a chair of Tropical Sanitation and Hygiene by the Rockefeller Foundation, which is essentially an American Institution, has from this aspect a significance which cannot be overlooked.

THE DUAL MANDATE.

AT a recent session of the Church Congress held at Eastbourne, Sir Frederick Lugard delivered an address on "The Principle of Trusteeship for Backward Races," in which he summarised some of the salient points elaborated in his extremely valuable book, *The Dual Mandate.* Sir Frederick, who is the British member of the Permanent Mandate Commission, described the steps which had been taken to safeguard the interests and help those backward races who are not yet able to stand by themselves in the strenuous conditions of the modern world. The Covenant defined the trust as consisting in the well-being and development of the people, and British Government added the words that where the interests of immigrant races conflicted with the interests of the natives, the latter must be paramount. A second obligation was the development of the material resources of the tropics and the utilization of the bounties of Nature for the necessities and comfort of the crowded populations of Europe, which could not exist without them. Trusteeship, therefore, comprised a dual mandate, and it was the high task of tropical administration to give effect to both. Rightly directed, the two principles were not only in no way antagonistic, but were complementary to each other. Where we found them in conflict the result was usually due to a failure to realize the true inter-relation of each to the other.

Railways had contributed largely to the extirpation of the slave trade by rendering possible the effective administration of distant regions, by increasing the mobility of the forces of law and order necessary to stamp out such practices, and by supplying a means of transport other than slaves. By conveying cheaply the produce of distant regions, which previously could not reach a seaport, they had afforded a market to the native producer for exportable crops, and added greatly to his material prosperity; they had made available to him, at prices which he could afford, the cloth and hardware and other imported goods, and so added to his material comfort; and they had to a large extent relieved him of the necessity of carrying goods for long distances on men's heads—so far as the line actually traversed by the railway was concerned—and had thus set free thousands of men for productive labour. Their construction, if carried out on right principles, was an educational agency of the highest importance. Products previously wasted for lack of a market were now sources of wealth and new industries had been created.

On the other hand, it was a matter for serious consideration whether too rapid an extension of railway construction, and the maintenance and repair of existing lines, might not impose too heavy a burden upon the present generations. It should be considered whether, in order to reduce the demand for labour, metalled roads and branch lines could not be dispensed with in favour of wheel-less vehicles on the tank principle such as had recently, under French auspices, crossed Africa from north to south and east to west over deserts and mountains and swamps. He believed that the development of the resource of Africa could not be conducted without injury to native welfare unless labour-saving devices were introduced.

Sir Frederick referred to the improvement in the educational system which had been effected, and said the new policy placed in the forefront of educational effort the creation of village schools

in close touch with village communities and the mass of people, instead of the literary education of a small urban class only. It regarded education as a means of making both the individual and the community to which he belonged more efficient in the sphere of life and the environment in which they were placed, whether it were village arts and crafts, or agriculture, or vocational teaching in more advanced classes. It aimed at the training of character and good citizenship and at inculcating a sense of responsibility and self-control. The teaching of religion was encouraged in order to replace superstitious beliefs and to assist in the formation of higher standards of life. History and geography, when taught, would have an African and not an English basis, and it was hoped that the result would be to produce leaders of African thought and not imitation white men.

The policy of entrusting to each native community the conduct of its own domestic affairs under its own rulers, to the greatest extent to which in each case it might be feasible to do so, was, he thought, a form of community education not less important than the form of individual education given in the schools. The degree of self-government must necessarily vary with the degree of the social evolution already attained. There was still a tendency among our Colonial administrators, to which he was personally opposed to introduce or to foster English representative institutions in Africa, and to create legislative councils with elected representatives. "I doubt whether this form of European democratic government by elected representatives where the mass of the people are wholly illiterate," he said, "is one which is adapted to African or indeed to Oriental races, nor has it so far proved successful in India or China."

Trusteeship was not a mere sentimental expression of what was called the "humanitarian conscience" in regard to the native races. It did not ignore the claims of the congested populations of Europe to share in the bounties of Nature in the Tropics, or the just and proper claims of those who had spent capital and effort in development to reap their reward.

The Power which accepted the obligations of a trustee was, moreover, charged with the duty of assisting the evolution of each native community, according to the stage to which it had already attained, by a system of education adapted to its needs; by improved methods of sanitation, and measures for the prevention or eradication of disease and the decrease of infant mortality; by introducing such systems of government as would foster a sense of responsibility and public service in the leaders and eradicate the servile habit of mind among the people.

On the economic side the preservation of forest resources, instruction in better methods of agriculture, improved varieties of crops, improved means of transport, better implements, and better preparation of produce for the market must go hand in hand with research for the destruction of insect pests and fungoid diseases of plants. Projects of railway and harbour construction and of irrigation and the demand for wage labour for European plantations must be limited to what could be reasonably met without harmful results to the native population. The prosecution of those aims should be outside the sphere of party polemics in order to maintain a consistent continuity of national policy—open to the criticism and suggestions of men of goodwill in any and every party of the State, but securely oriented in the interests of the millions whose progress is controlled by the British democracy.

PINK BOLLWORM NOTES.

Mr. C. A. Gomes, Curator, Botanic Station, Montserrat, has submitted a report on his observations on the Pink Bollworm of cotton (*Platyedra gossypiela*) in that island during the cotton season of 1925. The pink bollworm increases in the severity of its attack during the season. In June, 7 per cent. of the bolls were infested, in July, 18 per cent., in August, 32 per cent., in September, 64 per cent., in October, 98 per cent. were infested. These figures show the proportion of the bolls attacked, but not the extent to which the bolls are injured. Early in the season it is usual to find 1 larva in a boll, later the numbers increase until, at the end of the season there are commonly as many as 8 larvae in a boll. When there is an infestation of not more than 7 per cent. of boll infestation with only 1 larva in each infested boll, the loss in cotton lint is very small indeed, but at the end of the season, the injury amounts to almost total loss.

It is estimated that the loss of cotton in Montserrat, due to pink bollworm, is equal to about 25 per cent. of the total crop and, at present prices, this amounts to about £10,000.

Emphasis is laid on the importance of thorough cleaning up of all infested material in the field in order to reduce the numbers of pink bollworm carrying over from the old crop to the new, and of the necessity of early planting and early ripening in order to get the crop well advanced before the insect has developed to a numerical condition to make for a serious degree of infestation, and of earliness of destruction of the old cotton plants and of enforcing the provisions of the close season.

THE *Canadian Gazette* under date of December 3rd, 1925, reviews the report on the Trade Conditions in the British West Indies prepared by His Majesty's Trade Commissioner. In referring to cotton cultivation in Barbados the statement is made that the industry in that island is suffering from the ravages of the pink bollworm and the bollweevil. This is only partly correct, as the bollweevil which has caused so much loss to the cotton growers of America has not yet been reported as occurring in the British West Indies.

THE COLLEGE.

By H. Martin Leake, M.A., Sc.D., F.L.S.

At a meeting of the Royal Society of Arts on December 9th, 1925, at which the Hon. W. Ormsby-Gore, M.P., presided, the following text was read by Dr. Arthur William Hill, Sc.D., F.R.S., Director, Royal Botanic Gardens, Kew, in the absence of Dr. Leake.

The theme this afternoon is the Imperial College of Tropical Agriculture. It may be approached from several directions. It is an Educational Institution and I might introduce it to you as such, describing the courses taken, the students who attend, and the qualifications they may derive from their attendance. It is also an Institution for Research and I might describe the facilities for such work. Again it is situated in one of the most beautiful islands of the world, the scenery of which has been made famous by Kingsley and I might begin with a description of its setting. None of these, however, appeals to me for the purpose of introduction. The College is specialised and offers a training and education which will adapt students for a particular service in after life ; it is also Imperial and its appeal is to the students of the Empire. If, therefore, I am to place the College before you in its true perspective, it appears to me that I must begin with the Empire, and show what are the needs which the College is particularly designed to meet and how it proposes to meet them.

The development of the British Empire is an historical fact and must be considered from the aspect of history. Its condition is never static and those who are responsible for its guidance must throw their thoughts into the future if that guidance is to develop the *corpus sanum* necessary to a contented congeries of communities. But it is equally important that development shall be evolutionary and, in as much as the future arises from the past through the present, no guidance which ignores the past can be based on a sound foundation. What then is the past on which the future depends ? Very briefly the relevant facts appear to me to be these.

We have just celebrated the centenary of the first railroad and it is difficult to believe that only one hundred years ago travelling was limited on land to the coach on indifferent roads, to the saddle horse or, in places, to the feet, while at sea it was limited to the sailing vessel. The harnessing of power through the steam engine is the central fact which has rendered the development of these years possible and it is especially to the adaptation of the steam engine to transport that we must look for the explanation of the extent to which this development has proceeded. It is true that the steam engine is responsible for the rise of the factory as we know it but such a development would not have been possible without transport facilities to bring raw materials in bulk and to distribute the manufactured products. The factory system, which has developed as the result of what is commonly known as the Industrial Revolution, has led to the enormous increase in population of recent years, to its redistribution and aggregation in large cities which are dependent for the means of subsistence on an interchange of goods.

The results of this 100 years of progress are most apparent in Britain where not only the individual cities but the entire country is no longer self-supporting in the mere essentials of living. More than this it is not self-supporting in the raw materials, by the conversion of which into manufactured goods and by the sale of these, it is enabled to purchase those essentials. It is, probably, only in Egypt that a counterpart to these conditions is to be found.

I would, however, go further than this and say that the same conditions are rapidly arising throughout the temperate zone. America, till recently, a country crying for population has already reached the stage when she views an excess population as a danger which must be guarded against and is making her immigration laws more stringent. Japan in like manner has a population for which she has to seek an outlet outside her shores. We are, in fact, at the threshold of a development which will receive greater and greater recognition with each successive year, it is no less than the organisation of production, in the less populated and more productive portions of the earth's surface, namely the tropics, to provide the essential needs of the densely populated temperate portions of the globe for the benefit of those which are more densely populated. And, in as much as it is England which is the least self supporting of all countries, it is to England that we would look for the lead in this development. Nor is she ill situated in this matter. She owns and administers vast tracts of productive land within the tropics which at present yield but a tithe of their latent capacity. If her population is to retain the *corpus sanum* essential to contentment she must develop these areas or she will lose the position she has attained and now holds among the nations.

I pass, then, to a consideration of how this development is to be effected. As Professor Knowles has shewn, arguing from the historical aspect, Colonial development has proceeded on definite lines which have been dictated by the same agency to which reference has been made above—namely transport. As long as land transport was limited to the beast of burden or even to man as a porter, as in Africa, penetration and development was limited to islands and the coastal tracts ; the extraction of the wealth of the hinterland remained a practical impossibility. The interior had necessarily to await, and in many cases, still awaits, opening up by more certain means of transport before the potential wealth could be placed at the disposal of those crying aloud for it. Transport is thus the key to the situation and this has nowhere been more clearly recognised than in the report of the East Africa Commission. But if it is the key it is not the

sole requirement if full advantage is to be derived from these areas. A key may be essential to open the cupboard but the starving man will not benefit much from its possession if the cupboard be bare. I would direct your attention, therefore, to the necessity of insuring that the cupboard be well stocked when opened.

This leads me to the subject with which we are more directly concerned this afternoon. These areas are, and must remain as far as we can see, agricultural and their development must be based on agriculture. But again progress must be evolutionary and we must consider the present position in those tracts if dislocation is not to result. It is not possible, here and now, to deal with special cases and I must confine myself to broad outline. So considered, there is, throughout such areas, a population on the land; a population with an organisation, usually tribal, which includes among its customs a more or less clear recognition of rights in the land. In cases where the indigenous population is very sparse and where the country is suited for a permanent white population expropriation may be justifiable for, as the East African Commission recognises, there is a duty to observe to mankind as a whole as well as to the local community. As I have stated elsewhere, the world has grown too small to justify a small community claiming the right to occupy a large area unless it undertakes development. But if expropriation, which means the appropriation of land by aliens and the reduction of the population to the position of a wage earner, be not possible, what is a possible development? Economic agriculture for the production of produce which finds its market outside the country involves bulk production for which not only is the backward population unsuited and the unit too small but for which capital is an essential.

This is the problem, but at the back of it all is the inhabitant of the country who must remain the ultimate producer. He has to be organised to produce without losing his status as a land owner; he has to be provided with seed if the produce, when bulked, is to possess that uniformity which alone finds favour on the home markets; and he has to be taught better methods than those of his ancestors. The dependence of the temperate zone on the tropics is no new phenomenon, it is a dependence which has become more and more marked with the years. But, till the war, the change had been so gradual that it is doubtful if any but a few really appreciated the trend of affairs in this matter. The war has wrought an economic upheaval which has thrown a searchlight on many such changes and which must hasten these. Can it be doubted that, if the cupboard is to be found well stocked when the key of transport is provided, we must take steps to make it so, and can it be doubted that one of the essential needs will be trained men? Trained men are required to organise the collection and preparation of produce for the market; trained men are required for the organisation of seed supplies; and trained men are required for the instruction of the backward tiller of the soil. Nor is this the limit for the demand of trained men. Agriculture for its success depends on the adaptation of the plant to its surroundings. It is not possible to enter a tract and from *a priori* considerations state what will be the best agricultural practice. Agricultural practice is the result of a process of trial and error. In old countries that practice is the result of a long series of such trials conducted in a way which is so far from being recognised as such that it is usually termed tradition. In new countries where tradition has not built up a fundamental practice this has to be established by other means, for events are moving too rapidly to allow of such a slow process, and these means are what are termed experimental. Again this is work for trained men. I may carry this line of thought yet another step. If we have found our crop suited to the conditions and if we have found the best method of growing it to maturity there may yet be a slip between the cup and the lip—something may intervene, a plague of locusts or a fungoid attack, to prevent us from reaping the reward of labour. The essential need for studying the diseases of agricultural plants is one which has been treated by abler hands than mine—those of the Chairman of our Governing Body, Sir Arthur Shipley—and I will only emphasize his conclusion, namely, that trained men are required to keep such pests under control.

(*To be Continued.*)

PURE FEED-WATER.

THE efficient operation of a sugar factory depends largely on a sufficient and regular supply of steam at the various stations. In order to ensure this, it is essential that the heating surface of the boilers be kept clean, since few sugar factories can boast of a boiler capacity above normal. Under the best conditions 90 per cent. of the feed water will be provided by the condensed exhaust steam; but some 10 per cent. must be supplied from an outside source. Unless this make-up water is known to be absolutely pure, it should be treated in some way. Chemical treatment answers in some cases; but cannot always be depended upon for the best results.

A leaflet recently issued by the Mirrlees Watson Co., Ltd., describes a Pure Feed-Water distiller for Sugar factories. A thermal efficiency of 95 per cent. is claimed for this apparatus, which is designed to treat impure "make-up" water. The life of the boiler tubes should be lengthened, and the troublesome operation of removing a hard scale from the tubes after crop eliminated by ensuring a supply of 100 per cent. distilled water to the boilers.

Two other leaflets issued by the same Company describe their Pure Feed-Water Evaporations and Surface Condensing Plant for Power Stations. They are deserving of study by Engineers who wish to keep their fuel bill at the lowest possible figure.

W.S.

RUBBER GROWING.

The Netherlands East Indies Industry.

By Dr. A. G. N. Swart and J. G. Fol.

The Netherlands East Indies occupy the second place among the rubber-producing countries of the world. At the end of 1923 there were 953,669 acres planted with rubber in these islands, compared with about 2,347,500 acres in Malaya and about 415,000 acres in Ceylon, and of this area 619,945 acres were in production. These figures do not include the native plantations, the area of which cannot as yet be calculated with accuracy. The total export of rubber, including native rubber, from the Netherlands East Indies in 1924 was 179,747 tons (of 1,000 kg.) or 42·67 per cent. of the world's production, including Brazilian and wild rubber. If 25 per cent. be allowed for loss of moisture on native rubber, the figures become 157,222 tons and 37·3 per cent. respectively.

Of the total planted area about 480,000 acres are in Sumatra, 420,000 acres in Java, and the remainder in the so-called Outer Possessions—Borneo, Riou, Banka, &c.

The great development in rubber growing in the Netherlands East Indies is due in the first place to two favourable natural factors—climate and rainfall. The climate is very consistent, the average temperature on the coast being 80° F., and the difference between the average temperature of the warmest and of the coldest months not exceeding from 2 to 4 degrees F. The rainfall is considerable. In the whole of Sumatra and Borneo and in the greater part of West Java and Celebes the average annual rainfall is more than 80 inches. Of the 700 stations in Java where the rainfall is registered, 132 record from 120 inches to 160 inches, 61 from 160 inches to 200 inches, and 8 more than 200 inches per year. This heavy rainfall and the continuously warm and equable climate are most favourable to the growth of rubber-producing trees, of which various species are indigenous.

Another factor which has had a favourable influence on the development of rubber cultivation is the abundance of cheap labour, at least in Java, which, according to the last census (in 1920), has a population of 33,000,000, or 688 persons to the square mile. Sumatra is in this respect far less fortunate, having a population of only 33 persons to the square mile, but by means of the large scale importation of labourers from Java, who are employed under Government guarantees of good treatment and hygienic conditions, on three-year contracts, the supply of labour for the rubber estates is also amply provided for there.

Further, the policy consistently followed by the Netherlands East Indian Government, of making no distinction whatsoever between planting companies of Netherlands and of foreign nationality, has greatly helped the growth of the rubber industry through the aid of foreign capital. The capital invested in rubber plantations in the Netherlands East Indies may be approximately divided according to nationality of ownership as follows :—

British	£ 16,250,000
Netherlands	14,250,000
Belgian	2,500,000
American	2,250,000
French	2,000,000
Japanese	1,250,000
Chinese, German, Swiss, &c.	1,500,000
Total	£ 40,000,000

The directorates of the vast majority of the rubber growing companies operating in the Netherlands East Indies are organized in the International Association for Rubber and Other Cultivations in the Netherlands Indies, the headquarters of which are at The Hague. Both Netherlanders and foreigners are members of the executive committee. This association constantly keeps in touch in important matters with the Netherlands Indies Committee of the British Rubber Growers' Association in London. The representatives of the directorates of the companies in Sumatra also have their own organization, the General Association of Rubber Planters on the East Coast of Sumatra ("A.V.R.O.S."), the activities of which are mainly concerned with the recruiting of imported labour. Quite recently a new organization has been formed in Java, representing rubber, tea, coffee, and others of the so-called hill plantations on that island.

In addition to the rubber estates laid out with European, American, Chinese, or Japanese capital, the rubber plantations of the native population have of late attracted considerable attention. In certain districts, Sumatra, Djambi, Palembang, Borneo, &c., extensive hevea rubber plantations have, with the aid and encouragement of Government officials, been laid out by the population. The product, which usually contains much water and dirt, is sent to Singapore and there milled into blanket crêpe. The export of this native rubber, which in 1921 had been quite small, suddenly rose in 1922 to 23,000 tons, in 1923 to 53,000 tons, and in 1924 to 90,000 tons.

In various quarters it was feared that in the course of time there would be a practically unlimited production from these plantations, from which a serious competition with the estate rubber would result. At the request of, and in co-operation with, the planters' organizations, an investigation was undertaken by the Netherlands East Indian Government into the extent and importance of native rubber cultivation, and although the enquiry is not yet finished, it may, from the results so far known, be concluded that in connection with the comparatively limited amount of labour available in the regions concerned, an appreciable increase in the present production is not to be anticipated.

The methods of cultivating and preparing rubber in the Netherlands East Indies are, of course, in the main similar to those employed in other rubber-growing countries. It may, however, be pointed out that in the Netherlands East Indies efforts are consistently being made to put the cultivation and preparation of rubber on a scientific basis. Young men who have received a special technical education in tropical agriculture at the Colonial Agricultural School at Deventer or at the Agricultural High School at Wageningen are being sent out as assistants on rubber estates. The system of experimental stations in the Netherlands East Indies has been very efficiently developed, and excellent work is being done in Java by the Central Rubber Station at Buitenzorg and the General Experimental Station of the "A.V.R.O.S." at Medan.

As a result of this close co-operation between scientific and practical men, various improvements in the cultivation and method of preparing rubber have of late years been introduced.

Information has been received by the Department of Overseas Trade from His Majesty's Consul at Iquitos, says the *Bulletin of the Rubber Growers Association*, that the improved prices for rubbers have led to merchants in that district taking a renewed interest in the extraction of latex. Most of the rubber trees have not been tapped for seven years and it is anticipated that they will give an exceptional yield.

NEW YEAR HONOURS.

SIR John Bretland Farmer.—According to cable news appearing in the local press, Professor J. B. Farmer, M.A., D.SC., LL.D., F.R.S., has been the recipient of a Knighthood in the New Year's Honours List. Sir John Farmer is one of the Governors of the Imperial College of Tropical Agriculture, representing the Imperial College of Science and Technology, South Kensington, where he is Professor of Botany and Director of the Biological Laboratories. This honour is undoubtedly conferred in recognition of Professor Farmer's long and highly valuable services as an Educator in the Botanical sciences, and for important administration work during the Great War. We congratulate Sir J. B. Farmer on the honour that has been conferred on him.

Sir Henry Alfred Alford Nicholls.—Dr. H. A. Alford Nicholls, C.M.G., is also mentioned in the cable news as a recipient of Knighthood in the New Year's Honours List. Dr. Nicholls has been for many years resident in Dominica where he has unceasingly laboured for the good of the Colony in all matters affecting agriculture, and he has rendered notable service in matters of legislation and administration as well as in connection with the Medical affairs of the Colony. The honour of Knighthood is, without doubt, a tribute to a lifelong service in the Colony in which he has lived and laboured. We congratulate Sir Henry Nicholls on the honour that has been conferred on him.

NATIVE RUBBER CULTIVATION.

Report on the Netherlands East Indies.

SEVERAL contradictory reports have been published during the last year with regard to the native rubber production of the Netherlands East Indies, some reports maintaining that owing to excessive tapping, &c., the maximum production of this area has already been reached, while others equally emphatically assert that the production of rubber will increase annually and constitute a very serious menace to British plantations. Mr. T. H. Baillie has recently published a report on a visit paid to the Residency of Bandjermasin on behalf of the Native Rubber Investigation Committee of Batavia. The following summary of the report should be of interest to all engaged in rubber planting.

The Residency of Bandjermasin is situated in the South-East of the Island of Borneo in the territory known as Dutch Borneo, and comprises an area of 388,427 square kilometres, and a population, according to the census of 1920, of 1,020,599, of which 2,725 were Europeans, 998,282 natives, and 19,592 foreign Asiatics. The rubber is exported principally from the port of Bandjermasin to Singapore and Sourabaya, the figures for the last five years being :—

Year.	*Singapore tons.*	*Sourabaya tons.*	*Total tons.*
1920	1,031	189	1,220
1921	733	156	889
1922	7,951	250	8,201
1923	12,964	112	13,076
1924	15,945	348	16,293

No figures are available as to the area under cultivation, but it is estimated that 14,603,000 trees are planted. Mr. Baillie considers this an under-estimate, but is of the opinion that approximately 11,150,000 trees were in tapping at the time of his visit. Of the areas planted in 1919-20 a large portion has since been destroyed by lalang and belukar fires while little of the remainder was kept in proper cultivation during the "slump" of 1920-22. No planting was undertaken during 1921-23. The labour supply is ample for existing needs, and the average daily wage of a labourer is 75 guilder cents. Most of the tapping is done on the "bagi-dua" system whereby the owner and tapper each takes half the rubber produced, the tapper retaining the lower grades. This is a viscous system which makes it advantageous to the tapper to produce as much rubber as possible irrespective of the damage done to the trees. Mr. T. J. Cumming summarises this method in the following words : "The system of tapping, number of cuts per tree, rate of bark consumption, are all entirely in the tappers hands, and as previously explained, so long as the 'bagi-dua' system is in force, the owner is powerless to prevent either rapid consumption of bark or even damage to his tree by wounding."

Another system although less popular, is in vogue whereby the owner purchases the rubber harvested by the tapper at a fixed contract price, which, at the time of Mr. Baillie's visit, was f.20 a picul. It is estimated that between thirty-three and thirty-five thousand labourers, indigenous mostly were engaged in tapping in the Residency.

The oldest rubber seen was planted in 1902. The trees are tapped about 18 inches from the ground, V-cut daily on half the tree. When the owner or members of his family perform the tapping the bark consumption varies from 1½ to 2 inches per month but more than twice this amount is consumed on the "bagi-dua" or contract system. The first bark renewal is good but is invariably tapped before the renewal is complete with the result that the second and subsequent renewals are bad. Virgin bark 3 feet from the ground is consumed in 18 months to 2 years, and while the bark is renewing, tappers in the "bagi-dua" system, tap higher up the tree, and indeed, wherever they can find latex-yielding bark, and more than one cut is made. Mr. Baillie is of the opinion that most of the rubber now in tapping has passed its best producing stage, and that, in all probability, the output will gradually decrease until 1929 when new areas will have reached tapping age. The increased exports of 1922-23-24 were due mainly to the resting of the trees during 1920 and 1921 when prices were so low that very little tapping took place. The estimated total export for 1925 is 20,000 tons from which must be deducted losses, from moisture and impurities, as yet undetermined.

The soil, generally, is suitable for rubber growing, particularly on the banks of the rivers and canals and the land bordering the rivers and on the undulating land near the hills. Every known disease to which rubber is subjected was seen, most holdings being affected by disease to some extent. "Brown Bast"—now believed to be a direct result of over-tapping—is in evidence everywhere. A recent census gave results of 3 to 5 per cent. of the trees being diseased. On the East Coast, Pegantan and Pasir, a great deal of the old rubber (1912 planting) is affected, and a census taken there gave results of 10 to 15 per cent.

[Copies of this report, and of that by Dr. Pekelharing, can be obtained from the offices of the Rubber Growers Association, 2, 3 and 4, Idol Lane, Eastcheap, London, E.C. 3, the price being 1*s*. 3*d*. each, post free]

The Editor requests that any subscriber who fails to receive *Tropical Agriculture* regularly should communicate with him immediately in order that the matter may be rectified.

JAVA SUGAR INDUSTRY.

By J. H. VAN HASSELT.

THERE are about 185 sugar factories in Java. They are situated principally in the centre and east of the island, but cultivation of the sugar-cane is extending to the west of Java, Sumatra, Celebes, and other islands. All these factories are equipped with thoroughly up-to-date machinery.

The average area of the estates is 1,350 bouws (one bouw = 1·75 acres); the Djatiroto factory, which is owned by the Handelsvereeniging Amsterdam, has an estate of 9,000 bouws, a figure approaching the area of the much larger plantations of Cuba. The total area planted with sugar-cane in Java was 105,702 bouws in 1894; in 1914 it has increased to 207,800 bouws, and in 1925 to 251,254 bouws. The increase in output has been still greater; in 1894 production amounted to 8,500,000 piculs (one picul = 67·16 kgs.); in 1914 to 22,747,979 piculs, and in 1925 to 36,800,000 piculs—a record figure. The yield per bouw, which was only 59½ piculs in 1878, had increased in 1898 to 103·15, in 1917 to 130·49, and in 1925 to 145 piculs.

Java has always produced about 13 per cent. of the world's output of cane sugar, in spite of the fact that that output has increased by about 60 per cent. since 1913-14.

In Java sugar-cane is grown on land leased to the concerns engaged in the sugar industry for a single crop or for several crops; sometimes the land is let on long lease. Agreements are concluded with the population of the "dessas" (villages) surrounding the factories, and not more than one-third of the cultivable ricefields belonging to the village must be under sugar-cane cultivation during the rainy season (west monsoon). A maximum planting area is fixed for each factory, and no larger area may be hired by that factory. Two-thirds of the land not taken up by sugar-cane plantations are planted with rice or other crops by the native owners. Rice is planted almost exclusively on irrigated fields, and in many cases the system of triennial alternation of crops is applied.

As soon as the rice harvest is over work is begun in preparation for the following sugar-cane crop. This preparatory work includes drainage of the land by systems of channels, digging planting gullies, aerating the ground, planting the sugar-cane slips (sugar-cane is propagated by cuttings, seed is used only for the purpose of obtaining new varieties of cane), irrigating the fields, earthing-up, and manuring (chiefly with sulphate of ammonia).

Whereas in former times the kinds of cane planted were mainly white Djapara cane, black Cheribon cane, and a few varieties of cane brought from all parts of the Archipelago, the great increase in the yield per bouw came after 1902, when large areas were planted with the new varieties No. 100 P.O.J. and 247 B.

The Java sugar industry contributes large sums year by year towards the laying down or improvement of irrigation systems intended to effect the most economical distribution of the water available. The native population derives an equally great and probably even a greater benefit from the assistance thus given by European capitalists, owing to the increase in the yield of their rice fields. In 1921 and 1923 respectively the sugar industry expended 2,500,000 fl. and 1,500,000 fl. on irrigation.

The cane takes from 12 to 14 months to ripen, and is cut when ready. On most plantations the transportation of the cane is carried out by means of railway wagons drawn by locomotives, or sometimes by draught animals, over an extensive network of permanent railways belonging to the plantations, the distance between the centres of the lines being usually 60 cm. or 70 cm. Temporary ("loose") lines, upon which small motor engines are now running, are laid from the cane fields to the permanent railways.

In the case of the larger factories with a crushing capacity of 25,000 piculs and more per 24 hours this system of transport for the regular supply of cane has already attained the dimensions of an immense organization.

The method of extracting the juice from the cane consists exclusively of mill crushing. The process used for purifying the juice depends upon the kind of sugar that is to be produced. In the case of brown sugar, the defecation process—that is, boiling the juice with a small quantity of lime—is employed. In the case of white sugars the sulphitation-defecation process, in which a rather larger quantity of lime is used, the excess being removed by means of sulphuric acid, or the carbonation process, for which De Haan's method is being utilized to an ever increasing extent, is employed. Some factories are now using the impure sap sulphitation process or the still more up-to-date Thomas-Petry process. Evaporation and boiling take place in a vacuum, and the products of the boiling are cooled to a greater or lesser degree and separated into sugar and syrup (molasses) in centrifugal machines. In the manufacture of white sugar fractionated centrifugation is the method generally employed. Brown sugar is dried by warm air in revolving cylinders before being packed in sacks, whilst white sugar is dried by steam in the centrifugal machines.

By far the greater part of the sugar produced in Java goes to foreign countries; the amount of cane sugar manufactured in the European manner consumed in Java itself is estimated at only 2,500,000 piculs, while the amount of the total yield of the native industry, in which sugar is extracted from sugar-cane or areng palm, is not known. Up to and including 1880 the greater part was sent to Holland; then, when the abolition of the "culture system" put an end to the Amsterdam sugar auctions, a considerable proportion went to England and later on, when cane sugar began gradually to be supplanted by beet sugar, to America. But as the latter country began to obtain larger and larger quantities from its own colonies and from countries with which reciprocity treaties were concluded, the exportation was directed to Hongkong. Later on large quantities of brown sugar were exported to Japan as crude material for refineries. Since 1902 British India has been a large purchaser of white Java sugar. Up to 1913 practically the whole of the Java crop was consigned to Eastern Asia, but large quantities of Java sugar went to Europe during the war, and ever since the amount exported to Europe has continued to be considerable. During 1924-25 a total quantity of about 7,000,000 piculs was exported to countries lying west of Suez; 8,800,000 piculs were exported to British India, 1,200,000 piculs to Singapore, 6,300,000 piculs to China and Hongkong, and 5,400,000 piculs to Japan.

SUGAR-CANE HARVESTER.

The Planter and Sugar Manufacturer in the issue for December 5th, 1925, contains an account of a demonstration of a sugar-cane harvester which appears to provide a practical solution of the problem of cane cutting by mechanical means.

Machines for cutting, topping and cleaning canes have been the subject of experiment for many years. The one under discussion has been invented by R. S. Falkiner. The demonstration was made at Bundaberg, Queensland, in September last. This harvester is stated to have the capacity to cut 20 tons of cane per hour, where the crop yield is 10 tons of cane to the acre and 40 tons per hour in a 20 ton per acre crop, *i.e.*; 2 acres per hour where the yield ranges from 10 tons to 20 tons of cane per acre, under the field conditions existing at Bundaberg. The cost of operating works out at 10 shillings per hour or 3*d.* to 6*d.* per ton of cane. The cost as stated includes fuel, lubricating oil and wages. The machine is operated by one man, the motor power is provided by two Austin engines, each of 20 H.P., using kerosene as fuel and consuming approximately 2½ gallons per hour.

In this trial the cane appears to have been burnt before harvesting. The cane is cut at or below the surface of the soil, passed through the carrier, where the burnt trash is removed by a powerful air blast, the tops are cut off and the clean canes passed out at the side of the machine, where they may be dropped in any size of bundle, as desired. The discharge of the cut and trimmed cane is at a sufficient height, so that the bundles may be passed at once into a cart or wagon moving alongside the harvester, and thus save one handling of the crop.

The cane appears from the report to be well cleaned and topped. The problem of the trash in unburned canes and green (unripe) canes is still engaging the attention of the inventor.

The West India Committee Circular of December 17th, 1925, publishes a similar account of this trial also with illustrations.

THE COFFEE BERRY BORER.

In an article which appeared in *Tropical Agriculture* for February, 1924, entitled Coffee, reference was made to a serious pest of coffee which had made its appearance in Brazil. This insect is a small beetle known as the coffee berry borer (*Stephanoderes coffeae* Hag). This and *S. hampei* have been recorded from the Dutch East Indies, East and West Africa and Uganda, and there has been some doubt whether these two names refer to the same insect or whether they apply to one and the same species. The fact remains, however, that in the countries mentioned, Dutch East Indies and what amounts in general terms to the coffee growing localities of Tropical Africa, there is a pest of coffee which attacks the berries, causing severe damage.

In Africa the injury does not appear to be so serious. In Java and Sumatra it has been much more noticeable in recent years. Within the past five years, probably, the berry borer has become a pest of coffee in Brazil.

The Tea and Coffee Trade Journal, New York, has published articles on this insect and has frequently referred to it in the general news items on coffee in Brazil. In the issue for November, 1924, there appears the report of a commission appointed in May, 1924, by the Secretary of Agriculture, to investigate the insect in Brazil. The report states that the insect had undoubtedly been present in the coffee plantations in the Municipio Campinas for at least three years.

At the time of the investigation 2,000,000 trees were strongly attacked; about 6,000,000 notably contaminated, and in about 30,000,000 trees the degree of infestation was medium, in addition to the trees under suspicion on account of their situation with regard to the infested zones. The insect was found to infest all varieties of coffee, attacking the berry only, and no other food plants were discovered.

The insects penetrate the pulp and tunnel into the seed, the eggs being laid in the entrance tunnels of the parent female. The whole life cycle is passed in the coffee fruit, and it appears that often, without leaving the berry, the females of the next generation lay eggs in the same fruit and the destruction of the fruit is continued. No parasites or other natural enemies were found.

It was recommended that the washing of coffee in infested areas should be completely abolished, as the insects would be carried down the water courses and thus serve to infest new areas. Immersion of the fruits for from 40 to 80 hours did not prove fatal to the insects in them and they also survived drying in the yards for 15 days exposure to the sun. Fumigation of the picked coffee with carbon bisulphide at the rate of 400 grammes in each 100 cubic meters, for 36 hours, has been found a satisfactory treatment, while preliminary trials with fermentation of the picked coffee promised favourable results. It was believed that the fermentation of the coffee pulp will produce a temperature sufficiently high to prove fatal to the insects.

In more recent numbers of the *Journal*, those for 1925, there is further information on this subject. In the May number, it is stated that the coffee berry borer in Brazil is a native of South America and that it occurs in Surinam where it has been known for some years. In this Dutch Colony, however, the insect does not tunnel into the seed, confining its attacks to the pulp and consequently the loss to the grower is not great. It is stated, also, that previous to a few years ago the behaviour of the Stephanoderes beetle in Java was similar to what it is at present in Surinam.

The statement that *S. coffeae* and *S. hampei* are two distinct species and that *S. coffeae* has changed its habits from being merely a borer in the pulp of the coffee berry to tunnelling into the seed will probably be taken under further consideration and either be confirmed or amended.

The Defence of Coffee Service under the direction of the Secretary of Agriculture, Commerce and Public Works has been created for the purpose of combating the coffee berry borer and enforcing the laws which are made in this connection. This Service has undertaken the work with great energy, but many planters are slow to co-operate even where co-operation is in their best interest. The methods of combating this pest in the attempt to prevent its spread and to reduce its abundance in infested territory are fairly simple but, on the whole, rather expensive.

The Government has passed a law that all coffee reaped in the infested districts shall be fumigated with carbon bisulphide before being taken to the treating platform. Strict precautions are adopted to prevent any infested fruits being carried out of the infested district to those where the insect is not known to occur, and all fallen fruit is to be most carefully collected from the ground and burned. A very essential practice is that of "repicking," the careful going over all the trees after the crop is reaped and removing all the fruits, ripe or immature, that may have been left on the trees after the reaping.

It has been found that the life cycle of the coffee berry borer is about two months, and it is believed that if a close season of three months, that is, a period of three months with no fruit on the coffee trees, could be established it would do much to reduce the severity of the attacks in the following season.

A prominent coffee planter from Java who recently visited Brazil, in contrasting the condition under which coffee was grown in these two places, considered that the pest would be more difficult to control in Brazil than in Java. In Java the loss to the grower was sometimes as high as 80 per cent. of the crop. The coffee was mostly grown by large companies, but cultivations were in comparatively small areas and widely separated from each other and labour was abundant. In Brazil, the coffee estates were in the hands of individual owners, but they were close together so that there were enormous tracts of unbroken coffee cultivation. The companies generally are more willing to spend money on maintenance and pest control than individual owners, and the

existence of large uninterrupted areas of coffee cultivation facilitate the rapid spread of a pest such as the coffee berry borer which is not given to long-sustained periods of flight. The labour supply in Brazil did not seem to be adequate to the repicking operations which in Java have been found to be absolutely essential to any degree of control of this pest. Taking these points into consideration the Java planter did not think the prospects very good for the successful control of *Stephanoderes coffeae* in Brazil.

In this connection, it is reported that it has been found in Java that different varieties are attacked in different degrees of severity, and it is believed that the plant breeder can make use of this in producing a less susceptible variety, and at the same time, induce a fairly long resting period in the fruiting of the coffee tree. If a variety can be produced which is not very susceptible to attack, and, at the same time, this variety develops a period of two or three months when no flowers and fruit are being produced this would be of great assistance in helping in the control of a most serious pest.

The results of the work of controlling the coffee berry borer in Brazil by a service supported by the Government should be of interest to coffee planters and Agricultural Department officials in the British Colonies of Tropical Africa. The insect appears to be widely distributed in Tropical Africa and in those localities where it does not exist the greatest effort should be made to prevent its introduction and where it is known to occur the methods of control should be studied. In Java, a hymenopterous parasite is reported to have been discovered recently, but at present it does not appear to occur in any great numbers. Other parasites may be discovered in other places, and it is possible that in some districts the berry borer will be found in small numbers, doing little damage, accompanied by a parasite which in most seasons keeps it in check. Such a discovery would be of importance in the colonies where the coffee growing industry is being developed and extended.

H. A. B.

CORRECTION.

WITH reference to a statement which is made in an article on Fungus Pests by Sir Arthur Shipley, in the December issue of this Journal, to the effect that the Panama Disease of bananas has been discovered in the Gold Coast Colony, we are asked by the author to state that the reference should be to Sierra Leone. The Panama Disease occurs in Sierra Leone, but its presence in the Gold Coast has not yet been determined.

MARKETING OF AGRICULTURAL PRODUCE.

MR. R. B. FORRESTER in opening a joint discussion of the Economic and Agricultural Sections of the British Association on the "Marketing of Agricultural Products" said that in Britain very little serious attention has, as yet, been directed to the examination and analysis of marketing methods. Recent developments in other countries seem to show that a widespread tendency has set in towards improvement of marketing methods by means of control of quality and the setting up of grades or standards. So far, this has been especially associated with the efforts of the farmers themselves, though government action has been of great help in providing scientific assistance and impartial inspection. It would seem that the British producer will also be compelled to give attention to marketing developments, which so closely affect competition in the home market. No alterations of a radical character are, however, to be expected in Great Britain unless they have the support of the farmers themselves, since changes in marketing are bound to involve important modifications in the system of production.

"I have emphasized also the importance of paying a price according to quality. At present it is stated that the farmer who takes the trouble to prepare his beans properly can obtain no better price than his neighbour whose plantation is neglected. Since the cocoa must be fermented on the spot to avoid the necessity of carrying the bulky pods to a central fermenting and drying station, uniformity in fermentation can only be secured by educating the native to dry and ferment the beans himself, the merchant completing the process so as to ensure the cocoa reaching the European market without deterioration. Such a system is more consonent with the self-reliant traditions of British trade, and less 'bureaucratic,' than the demand that Government should employ expert cocoa samplers in every village, and prohibit purchase except of certificated cocoa"—*Sir Frederick Lugard on the West African cocoa industry in the "Dual Mandate."*

The St. Vincent Government Gazette of November 24th states that the advances to be made by the Government Cotton Ginnery on Sea Island Seed Cotton purchased on the co-operative system of the crop 1925-26 have been fixed at: 1st quality White, 10 cents per lb. and 1st quality Stained 2½ cents per lb.

TROPICAL WORLD NOTES.

Sierra Leone.

The Annual Colonial Report (No. 1275) for Sierra Leone during the year 1924, records that the year 1924 was marked by sustained progress in all directions. The increased stability of trade and consequent improvement in the Colony's financial position not only enabled the Treasurer to show a greatly increased balance of surplus assets but also justified a reduction (late in the year) of the ad valorem duty from 25 per cent. to 20 per cent. The export of palm kernels, which in 1923 has beaten all previous records, showed a further increase in 1924, and the export of other products was well maintained.

Agricultural propaganda was intensified in all parts of the Colony and Protectorate, the efforts of the Lands and Forests Department being conspicuously directed towards the better cultivation of ginger and the introduction of American cotton. Sierra Leone participated in the Wembley Exhibition and a return for the expense and work involved is expected in future increased trade.

The most important political event of the year is stated to be the inauguration of the new and enlarged Legislative Council, which under the Presidency of the Governor, consists of Official Members, the five senior Members of the Executive Council, Nominated Unofficial Members, not more than seven in number and three elected Members. The New Council was formally opened on November 25th.

The revenue for the year showed an increase over that of 1923 of £23,000 to £868,319. The increase of railway revenues from £189,297 in 1923 to £219,046 in 1924 is an index of enhanced trade prosperity. The expenditure increased from £727,661 in 1923 to £777,790 in 1924, which was less by £8,240 than the original estimate. The total imports for the year amounted to £1,730,643 and the total exports £1,711,438. The commercial exports exceeded the commercial imports by £146,116.

The shipments of Kola nuts amounted to 5,686,066 lb. valued at £180,976. Palm kernels exported during the year amounted to 61,117 tons, with a value, including duty, of £1,096,386 an increase of £127,589 over the value of the palm kernels exported in 1923. Exports of palm oil to the amount of 3,110 tons valued at £93,141 were slightly below 1923 but well over the average.

The export of ginger showed an increase of 10,942 cwt. (£59,397) over 1923, the total amount shipped being 38,847 cwt. with prices from 90s. per cwt. for grade A to 76s. for grade B.

The Lands and Forests Department added during the year a Research Division with an agricultural chemist in charge, and an Entomologist was appointed. Special work included soil survey of the country, negotiations with oil palm products, a tsetse fly survey, a study of insect pests of the crops of the country.

Important agricultural work of the year included the study of the cultivation of swamp rice and the extension of the areas in which this crop is grown; the cultivation of cacao, especially in the Southern Provinces; the distribution of coconuts for seed and the encouragement of planting in the littoral belt of the Southern Province; imported American cotton seed, Allens Long Staple, was distributed to the Chiefs and people of the Northern and Central Provinces, but unfortunately heavy rains on the ripening crop ruined much of it. The production of ginger has increased considerably, and the cultivation has been extended to the Northern Province; other crops which have been encouraged are, coffee, castor, ground-nuts, sisal, Mauritius hemp and tomatoes (for Export).

Gold Coast.

The following note taken from the Annual Report on the Agricultural Department, Gold Coast Colony, April 1924-March, 1925, should be of interest to cacao planters in the West Indies and elsewhere, who may have heard of the White Spot disease and do not know what it is.

"The season was characterised by an exceedingly severe exhibition of Harmattan. Towards the end of the season considerable alarm rose owing to cocoa from many different parts of the country showing white spots under the skin and between the divisions of the 'cotyledon.' Examination by the Mycologist and Chemist showed these spots to consist of a deposit of fat and crystals of matter which in the ordinary course would have been carried away during fermentation. Reports were received to the effect that the pods actually dried on the trees, hence when the beans of such dry or partly dry pods were put to ferment, the amount of liquor present or produced during fermentation was insufficient and resulted in solid matter being left on the beans when ready for drying."

Also affecting cacao, the collar crack disease due to infection by the fungus *Armilaria mellea* is reported as occurring on the roots of several trees. Infection of cacao trees from lapka roots and along 33 yards of silk cotton root has been demonstrated and the theory that infection in the field takes place by contact has been confirmed by the absence of rhizomorphs in Togoland.

Mention is made in the Report of the Sir Alfred Jones Bequest, a sum of money deposited with the Crown Agents for the Colonies, to which the Gold Coast Government has added an equal amount, "the interest on which is to provide scholarships tenable at the Imperial College of Tropical Agriculture, Trinidad, or an Agricultural College in the Gold Coast open to West Africans between the ages of 17 and 25 who are able to satisfy certain conditions and selected by competitive examination."

Cayman Islands.

The Cayman Islands consist of three small islands lying north-west of Jamaica. During the year 1924 (Colonial Report No. 1262) there was an ordinary catch of 2,500 green turtle of merchantable size, but the price of 30s. each was not remunerative. The sole market appears to be Key West in Florida but strong efforts are being made to secure other profitable outlets. The pursuit of the hanks-bill turtle for the tortoise-shell of commerce was more profitable, 3,419 lb. being secured and disposed of in Jamaica at an average price of £1 7s. 9*d*. per lb. The export of thatch-palm rope yielded only £640 compared with an average of £1,873 for the previous three years. The exports of spirits which contributed to local trade and substantially to Customs Revenue, has stopped! The excess of imports over exports is an extraordinary but recurring feature of the Colony's trade. In 1924 imports amounted to £51,416 and exports to only £16,317. The earnings of island vessels other than in the turtle fishery, the wages of long-voyage seamen abroad, and the remittances of working men in the United States and the Central American Republics to families and dependants within the islands account in five years for the difference of so large a sum as £177,000 in a community of approximately 1,000 families.

St. Vincent.

The year 1924 was from every point of view a very prosperous one for the Colony. The Revenue, amounting to £60,893 was the highest on record exceeding expenditure by over £7,000. The total trade of the Colony amounted to £310,890 compared with £270,048 in the previous year. It was found possible to set aside £11,000 as a Reserve Fund to be invested in good liquid Securities, thus fulfilling a cardinal requirement in the case of a small Colony like St. Vincent, which is subject to periods of severe economic depressions from time to time.

The Colony is wholly dependent for its prosperity upon agriculture and it is satisfactory to note from the export returns of the produce of the Island that the export of arrowroot (valued at about 4*d*. per lb.) showed a considerable increase on that for 1923, the export of cassava starch (valued at about 2½*d*. per lb.) was about double that of the average export for the last ten years, while the export of Sea Island cotton, 520,369 lb., the first quality of which was valued at 2*s*. per lb., though slightly below the record year 1923 was well above the average export for the last ten years. This is a matter of congratulation in view of the alarm caused in 1923 by the appearance of the dreaded Pink Boll worm, and shows that, thanks to the careful carrying of the legislation and regulations framed to meet the outbreak, the disease has been kept under control. For this the Agricultural Department of the Colony deserves the greatest credit. A marked feature of the agricultural life of this Island is the increasing attention paid to copra. For the year 1924, 645,973 lb. valued at £5,430 were exported, as against 356,626 lb. valued at £2,959 in 1923. Since 1918 the export of copra has increased by leaps and bounds. In that year, 7,104 lb. of a value of £189 were exported. As regards syrup, another bumper year may be recorded. The quantity shipped amounted to 261,127 gallons, value £15,758. This has not been exceeded for many years, except during 1923 when 275,932 gallons, value £18,711, were exported.

New Hebrides.

The Annual Colonial Report for the New Hebrides (No. 1273) for the year 1924, indicates a satisfactory condition of affairs in that Colony, except for the shortage of labour which continues to hamper agricultural development.

The Exports and Imports of the Colony both showed an increase over 1923. The figures for the principal products exported in 1924 being Copra, 6,792 tons, value £125,652; Cotton, 1,420 tons, value £46,068; Cocoa, 1,517 tons, value £60,716; Coffee, 281 tons, value £7,110; Wool, 33 tons, value £10,805.

The area of land under Cotton had increased in 1924 over the area planted to this crop in 1923; Coffee and Maize areas remained about the same.

WE understand that the Seventh International Exhibition of Rubber, other Tropical Products and Allied Industries, will be held at the Grand Palais, Paris, from January 21st to February 6th, 1927, under the distinguished patronage of the President of the French Republic, and under the auspices of the French Ministry of Colonies and the Ministry of Commerce and Industry. The Commissioner General is Miss Edith A. Browne, F.R.G.S., and the offices are at 43, Essex Street, Strand, London, W.C. 2.

THE use of rubber as a shock absorbing medium in motor car suspension is referred to in recent numbers of Exchange journals as likely to be of important development in the near future. The Adams patented springless suspension is being tried in America and will probably in a short time come into general use in other places. The principle involved comprises two bodies one held rigidly to the axle and the other pivotally to the chassis frame. Each of these has its inner face with cog-like projections. Between them is a rubber body with similar cog-like structures on each face which fit into the interstices of the two metal bodies. The rubber takes the shock and the entire assembly simply takes the place of the ordinary steel leaf-spring.

The prominence of this style of suspension is being favourably commented on and it is stated that for rubber to withstand the strain of this kind of work has necessitated a very considerable development in the preparation of rubber.

LOSSES IN CUT CANE.

Results of Experiments Conducted at Usine St. Madeleine, Trinidad.

By W. Scott, B.Sc.

The efficiency of the modern sugar factory has been improved to such an extent that further reduction of losses can often only be brought about by means of extra equipment involving large expenditures. This is not always advisable, especially when sugar is low in value.

Factory losses receive a great deal of attention because they can be expressed as an exact percentage of the sugar entering the factory. Undoubtedly, much greater losses of sugar often take place in the cane itself before it reaches the mills, but those losses pass as a rule undetected.

It should be the aim of an efficient chemical control not only to detect and reduce losses in the factory; but also losses in the fields whenever this is possible. The elimination—or at least the reduction—of such losses can, in many cases, be effected by better care and organization in the cutting and transport operations, especially in localities where the cane is grown within a short distance of the factory.

The experiments described below were conducted on the estates of the Ste. Madeleine Sugar Co., Ltd., in an attempt to determine the approximate loss of available sugar in canes left lying in the field after being cut.

For each series of experiments about 100 canes were cut; and after thorough mixing divided into six lots which were left lying on trash under exact field conditions. The first lot was sent to the Laboratory on the day of cutting, the other lots at intervals specified in the tables below.

In the first series of experiments the loss in weight of the cane was not taken into account. In the second and third series all the lots were weighed on the first day; and again immediately before being sent to the Laboratory. The results in Tables 2 and 3 are calculated on the original weight of the cane. Actual factory figures for extraction and boiling house efficiency number were used in calculating the yield of 96° sugar. In arriving at the loss in value per ton of Cane, sugar was assumed to be worth £15 per ton after deduction of manufacturing costs.

TABLE I.*

TAROUBA ESTATE.

No. of Sample.	Yield 96° Sugar per cent. Cane.	Tons Cane per ton Sugar.	Loss in Available Sugar per cent.	Loss in Value per ton Cane.	Cane Hours Cut.
				s. d.	
1	12.74	7.85	..	..	Fresh.
2	12.26	8.15	3.77	1 5	24 Hours.
3	12.10	8.27	5.03	1 11	48 ,,
4	11.45	8.74	10.13	3 10	72 ,,
5	11.15	8.97	12.48	4 9	96 ,,
6	10.76	9.30	15.55	6 0	144 ,,

* Yields calculated on Weight of Cane reaching Laboratory.

TABLE II.*

TAROUBA ESTATE.

No. of Sample.	Loss in Weight per cent.	Yield 96° Sugar per cent. Cane.	Tons Cane per ton Sugar.	Loss in Available Sugar per cent.	Loss in Value per ton Cane.	Cane Hours Cut.
					s. d.	
1 ..		13.28	7.53	..	..	Fresh.
2 ..	1.60	13.17	7.60	0.83	4	24 Hours.
3 ..	3.01	12.85	7.78	3.24	1 4	48 ,,
4 ..	6.89	12.36	8.09	6.93	2 9	72 ,,
5 ..	8.66	11.65	8.58	12.27	4 11	96 ,,
6 ..	8.63	11.25	8.89	15.29	6 1	144 ,,

* Yields calculated on Original Weight of Cane.

TABLE III.*

HARMONY HALL ESTATE.

No. of Sample.	Loss in Weight per cent.	Yield 96° Sugar per cent. Cane.	Tons Cane per ton Sugar.	Loss in Available Sugar per cent.	Loss in Value per ton Cane.	Cane Hours Cut.
					s. d.	
1 ..		14.05	7.12	..	..	Fresh.
2 ..	3.25	13.24	7.55	5.77	2 5	24 Hours.
3 ..	3.00	12.99	7.70	7.55	3 2	48 ,,
4 ..	6.00	12.06	8.29	14.16	6 0	72 ,,
5 ..	6.00	11.68	8.56	16.87	7 1	96 ,,
6 ..	8.50	10.31	9.70	26.62	11 3	144 ,,

* Yields calculated on Original Weight of Cane.

No experiments were conducted with burnt canes; it is probable, however, that the latter would deteriorate even more rapidly than the canes used in the above experiments. Those experiments should focus attention on one feature of field operations which is often attended by considerable delays: the picking-up of the cane. The bulk of the cane cut in a field may be sent to the factory fairly promptly, but several days often elapse before the balance of the cane lying in the trash is picked up. The percentage of this cane to the total yield of the field varies considerably, and depends on the amount of trash in the field and also on the supervision given by the Overseer in charge of cutting and loading operations. Other tests have shown that such canes suffered losses approximating those shown in the tables above.

In conclusion it must be pointed out that field losses of sugar can be much higher than any losses to be expected in a modern factory. Hence, every effort should be made to reduce those losses; at least in that part of the cane supply which is under the factory's control.

I.C.T.A.: ASSOCIATESHIP.

THE establishment of an Associateship of the College and the terms on which it will be granted have recently been determined by the Governing Body.

It is open to Fourth Year and Post-Graduate students who have completed one year at the College, on presentation to, and acceptance by, the Academic Board of a thesis the subject of which has the approval of that Board.

Post-Graduate students who have passed through the College prior to its institution will be eligible for the Associateship and should present a thesis for the consideration of the Academic Board.

The first Associateship has been awarded to Mr. John Collier Hopkins, B.SC. (London).

THE New York Cocoa Exchange, founded in October last, of which a notice appeared in the January issue of *Tropical Agriculture*, has now decided to allow trading in futures in rubber and will accordingly increase the membership of its board of management, according to *India Rubber Journal* for December 19th. It is probable that the name will be changed to the New York Cocoa and Rubber Exchange.

AN APPRECIATION.

THE College has recently received from Messrs. Edward Elwell, Ltd., Edge Tool Manufacturers, Wednesbury, England, a much appreciated gift in the form of a complete assortment of agricultural hand tools and implements—the principal kinds in tropical use. The set comprises 24 pieces, ranging from hoes, picks, diggers and shovels of different types to matchets, pruners, axes and certain carpentering accessories. These tools are solidly constructed and present a well-finished appearance. They form a useful acquisition for demonstration purposes and we tender our thanks to the donors for the generous gift.

Mr. Frederic Hudd, Canadian Trade Commissioner, New York City, writing under date of December 9th, 1925, reports that the final United States Department of Agriculture estimate of cotton production for 1925 forecasts a total of 15,603,000 equivalent 500-pound bales. This figure is based on reports as of December 1st, and is 305,000 bales greater than the estimate based on November 14th, reports. Last year's crop totalled 13,627,936 bales.—(*Commercial Intelligence Journal.*)

AGRICULTURAL NOTES.

COMPILED BY THE COLLEGE DEPARTMENT OF AGRICULTURE.

Implement Cultivation in Mauritius.

DEVELOPMENTS in connection with the use of mechanical tillage in the cultivation of sugar-cane and other tropical crops have been kept constantly before the readers of this Journal. The following abstract, containing suggestions which may be useful in other regions, is taken from the 1924 Report of the Director of Agriculture, Mauritius, and indicates the trend of recent progress in that country:

Of all the directions in which economies of labour can be effected none is so important as the employment of tractors, ploughs and implements. In this connection a number of important advances were recorded during the year; among these is the formation of a definite organisation between a group of 10 estates for the purpose of providing expert guidance in relation to matters affecting the use of tractors and implements.

The desideratum of a plough which will make a square sided furrow for planting, continued to attract attention, and by the end of the year one estate had actually imported a plough designed by Messrs. McLaren & Co., with this object in view. The performance of this implement will be watched with considerable interest. Another estate has also imported an implement designed to do similar work but results have so far not proved satisfactory. On the other hand several estates have experimented with a modification of the Oliver double mouldboard tractor plough with extension pieces bolted to either side of the two breasts. This implement produces a wide deep furrow with a slightly curved bottom, in which planting is performed without any cleaning of the furrow by hand. Several hundreds of acres have this year been planted in this way, and in the writer's opinion procedure on these lines will probably ultimately constitute the solution of the problem. The round bottom furrow for planting is accepted as satisfactory in most cane producing countries, and it is difficult to see how or why insistence on a square sided furrow is likely to influence the ultimate yield of cane per acre, which is after all the principal criterion.

Much attention has also been devoted on certain estates to the possibility of finding some form of plough which would satisfactorily bury cane straw in fields that are being prepared for plantation. As a result the Mon Desert S. E. Co., during the year caused to be built an implement designed to perform this operation, based on specifications of a machine used on the Pepeekes plantation in Hawaii, furnished by Mr. Louis Baissac, Sugar Technologist of the Department of Agriculture, and modified by Mr. Julien de Speville, Manager of Mon Desert and Mr. Henri Pitot, ploughing expert to the group of estates mentioned above. In its final form the implement consisted of: An Oliver double mouldboard plough with extension pieces bolted to the top of the breasts preceded by a row of disc coulters set at different heights which cut up the trash into short lengths, and thus facilitate ploughing in. The implement was tried on a considerable scale at Mon Desert and gave very satisfactory results.

For uprooting cane stools and preparing land for planting, local opinion has definitely accepted the two or three furrow disc plough as the most suitable implement, particularly on account of its ability to withstand the rather rough conditions which are met with in ploughing cane lands in Mauritius, and which are apt to cause considerable damage to shares or breasts in the mouldboard type of implement. At present the best plough for this type of work has proved to be Ransome's three furrow disc plough.

For ploughing out cane stools and preparing land for planting, Caterpillar tractors are practically exclusively employed, the No. 1 Cletrac tractor being used on the majority of estates. Three estates employ Renault tractors for this form of work, while one estate is now using a Sanderson wheel tractor with very satisfactory results; other wheel tractors have not so far met with any degree of acceptance, the types so far tried, viz.: the Austin and the Fordson are in the general opinion of the planters too light and underpowered for work in Mauritius soils. It should, however, be mentioned that an Austin tractor working a two furrow mouldboard plough has given satisfactory results during two years at the Reduit Experimental Station for uprooting cane stools and furrowing.

It is believed by many, however, that heavier and higher powered wheel tractors may eventually prove more suitable than Caterpillar tractors owing to the lower initial cost and smaller repair bill. Experience with the Sanderson tractor on a single estate which has employed it so far tends to substantiate this view. Two other tractors of this type are expected shortly and the importation should lead to interesting results.

For weed eradication and deep cultivation in the interlines of growing canes, the No. 3 Cletrac tractor with an Oliver No. 36 cultivator is at present the most satisfactory combination. For keeping down weeds, various forms of horse hoe drawn by one or two oxen are now extensively employed. The use of oxen for this type of work necessarily causes it to be slow, but so far the employment of mules has been vetoed on account of their liability to Surra. If the campaign for the eradication of Surra at present being carried on by the Department of Agriculture gives the results hoped for, the employment of mules should eventually become possible once more and this would probably materially improve the situation.

The existence of large numbers of stones and boulders in the cane fields of Mauritius is one of the chief difficulties in the way of the employment

of tractors and implements. However, many estates have set themselves to work to improve matters in this respect by re-arranging stones in rows or heaps suited to the work of tractors and ploughs, and it is a matter for astonishment in what apparently unpromising land, intelligent action in this respect has brought ploughing within the region of practical politics. In rearranging stones, tractors are also finding extensive useful application.

Another factor which has proved a source of difficulty in ploughing is the small size of the average cane field which has entailed much waste of time and fuel in the repeated turning of the headlands. This defect is, however, remedied slowly on the estates which have seriously taken in hand the solution of the problem by ploughing.

A third factor which influences the situation is that of obtaining really reliable labour for working with tractors and ploughs, and this has led to a considerable loss of efficiency combined with much unnecessary wear and tear. In this respect also improvement is slowly making itself felt, and it is becoming realised that the employment of a good ploughman even though his wages may be high, is a real economy.

So far actual planting is still accomplished by hand but there does not seem any very obvious reason why one of the mechanical planting devices which are so widely used in Hawaii and also in Australia should not be successfully employed also. The same remark probably applies to fertiliser distribution. In this connection mention may be made of a simple and ingenious device for applying molasses to canes, recently patented by Mr. H. Bourgault, Manager of Ferney Estate; it consists of a tank mounted on wheels of such breadth that they will conveniently pass between cane rows and is hauled by an ox; the molasses is delivered by two spouts the flow of which can be regulated according to the magnitude of the application which it is desired to make.

It may be expected that the more thorough aeration of the land due to improved cultivation will result in improved yields; data in this respect are still lacking but the Department of Agriculture has in hand a number of trials on some scale to test this point. It may be added that on at least one estate in the lower part of Savanne experience has proved that ploughing has had the effect of making the crop earlier, doubtless owing to the improved cultivation facilitating the removal of superfluous water and lessening the check due to chill from evaporation.

The subscription to *Tropical Agriculture* is six shillings per annum, post free, to all countries within the British Empire or seven shillings, post free, to all other countries. Subscriptions can commence at any time during the year.

SUGAR IN HAWAII.

THE following note, taken from the editorial page of the *Planter and Sugar Manufacturer* December, 1925, emphasizes the value of research and scientific control on sugar estates, and shows that an increase of output of some 300,000 tons of sugar has been obtained in the Hawaiian Islands with practically no extension of the area cultivated under sugar-cane.

The crop just harvested in Hawaii establishes the record of production of sugar in this territory and amounts to 695,000 long tons of sugar. The acreage from which this crop was harvested is not stated as yet, however, it is reasonable to assume that this crop was harvested from approximately the same acreage as previous crops. Statistics show but little variation in the area of cane harvested in Hawaii annually since 1913. The largest area harvested was 124,000 acres and the smallest area 111,000 acres. During this period the average area harvested was 116,000 acres. The yield of sugar cane per acre during this period has varied from 39 to 51 tons with an average of 42 tons for the whole period. The largest tonnage reported was in 1924, in which year the area harvested for cane averaged 51 tons per acre, and the 1925 crop which has just been completed is generally accepted as yielding a larger tonnage per acre.

In the last 20 years the Hawaiian sugar crop has shown an increase of approximately 300,000 tons. This increase has been due to the practical application of scientific investigations in both field and factory. The Hawaiian sugar industry started the application of scientific principles in the sugar industry by the establishment of the Hawaiian Sugar Planters Association about 1895. At that time there were practically no scientific specialists engaged on the plantations. Since then the number engaged has rapidly increased and this year, 1925, there is not a plantation in the Hawaiian Islands whose operations are not controlled by specialists having scientific training. It is but reasonable to credit this large increase in sugar production without any expansion of the area to the applications of scientific principles in a practical form in both factory and field. This has been attained in an economical and profitable manner as is clearly indicated by the financial stability of the industry in Hawaii. The success of the sugar industry in Hawaii, in overcoming the many difficulties that have confronted it through scientific research and the practical application of scientific principles is an excellent example of the attainments possible in other cane sugar producing countries if they emulate the Hawaiian policy of practical application of the results of scientific investigation, co-operation and thorough discussion of their sugar crops.

Readers are requested to inform the Editor immediately of any change in address.

REVIEWS.

"OUTLINES OF AGRICULTURAL ECONOMICS" by Henry C. Taylor, New York, The Macmillan Company, 1925. pp. XII, 610.

This book has already earned an enviable reputation as a standard text book on Agricultural Economics, so that it is not necessary to describe in any detail the subjects embraced. In broad outline the scope of the book is to describe the fundamental economic principles underlying agriculture. The present edition contains much additional information on marketing and agricultural co-operation, subjects which are rapidly assuming a high degree of importance. The chapters on farm management have been re-written, incorporating new material, and additional chapters on insurance and the future of the farmer have been inserted. The whole text has been brought up to date. Studied in conjunction with such valuable sources of raw material as the Year-books of the United States Department of Agriculture, this volume forms an admirable basis for a course on agricultural economics. In the preface the author remarks on the unprecedented progress of agricultural economics within the last six years—a development in which the author has played no small part. Under the existing circumstances a thorough knowledge of the principles outlined would prove invaluable both to farmer and statesman, and every student of agricultural economics should certainly secure easy access to such a valuable publication. The classified bibliography covering 8½ pages will prove of great service to the student desiring to pursue any particular topic further.

C. Y. SHEPHARD.

EMPIRE COTTON GROWING CORPORATION Memorandum by the Mechanical Transport Sub-Committee; Mr. G. H. Baillie, Mr. R. H. Brackenbury and Col. C. N. French. pp. 20, Plates VIII October 25th. Price 2*s*.

The opening up of the hinterlands of Africa offers a fascinating problem. The old system of porterage has become even in one generation almost a thing of the past. It is a system which raises added difficulties as the amount of produce to be transported increases. Labour is not available and prices rise. In this respect it offers a direct contrast to railways which cheapen transport as the total amount of produce carried increases. For another reason any large development involving the production of an exportable raw material is unthinkable under a system of porterage; not only is the labour not available but it is best employed directly in production.

Given a sufficiency of produce railways are the best and most reliable of all forms of transport. Distances are large and unproductive regions, or regions with sparse population, have to be traversed. There is, consequently, small likelihood of private enterprise taking up railway construction in the first instance. At this stage they are neither economic nor commercial propositions and private enterprise drives up freights to a point which checks development. Yet they are essential to progress and form probably the best means in which Government by guarantee can help development.

There is, however, a limit to railway construction. Produce for years to come is likely to be raised extensively and not intensively. These countries cannot, therefore, carry any intricate network of railways and their limit is reached in the provision of main lines leading to the ports. There arises, consequently, the problem of collection of produce to the railside over distances which do not admit of a porterage system. Feeder roads are developed in Uganda but do not appear to meet all requirements, the cost of construction and upkeep forming too heavy a charge. The solution appears to be in the development of motor transport on vehicles which are capable of working across country or, which, if used on tracks (roads), will compact rather than break up the surface. Motor transport has passed out of the region of testing the reliability of the motor and has become a question of road conservation.

The report, while discussing the economic problem, gives an account of the work of the Corporation in providing and testing out different types of motor vehicles. The 'half track' lorries by the manufacturers both of the Keyresse and of the Roadless Truckian tractor are promising in their effect on road (sand, earth or grass) surfaces but their commercial value requires to be tried out. There is a long way yet to be traversed before the railway feeder problem is solved for such countries, but the report under review indicates also the large progress that has been made.

H. M. LEAKE.

The visit of the Empire Cotton Growing Corporation Post-Graduate Students at the College, to one or more of the Islands where cotton is grown and handled on a commercial scale is a feature in the training and experience of these Students. In the session 1922-23 two Students and in 1923-24 four Students visited St. Vincent, Barbados, and the Leeward Islands. In 1924-25 nine Students and in the present 1925-26 session ten Students have visited St. Vincent. St. Vincent offers advantages for a visit of this kind. The Cotton Experiment Station gives an opportunity to see the work that is being carried out in the development and maintenance of pure strain of cotton, and the manurial and other experimental work. There are two Ginneries, one maintained by the Government as a Co-operative Ginnery.

The finest grades of Sea Island cotton are produced in St. Vincent where great success has been achieved in the control of cotton stainers which were at one time most seriously affecting the cotton crop, and other pests which in St. Vincent have held a minor position.

COLLEGE NEWS.

The College Christmas vacation extended from December 19th, to January 3rd. The Second Term of the 1925-26 session commenced on January 4th, 1926.

Professor C. Y. Shephard visited St. Vincent during the holidays, by the same opportunity as the Post-Graduate Students interested in cotton cultivation.

During the month the College Football team played a match against the Caroni Football team, which resulted in a win for the College with the score of 5—0.

L. S. Birkett, a student of the College, while in Barbados for the Christmas holidays, was selected to play for the Island in the match against the M.C.C. on January 5th and 6th.

His Excellency Sir Horace Byatt, K.C.M.G., on entering the building declared it formally open, after which the party went over the building and inspected the offices, the library and the several lecture rooms and laboratories.

The following are the names of the Parliamentary Delegates:—Viscount Peel; Lord Queenborough; Rt. Hon. F. O. Roberts, P.C., M.P., Commander Carlyon Bellairs, M.P.; Mr. A. E. Jacob, M.P.; Capt. Arthur Evans, M.P.

The Committee of members of the Imperial Parliament visiting the West Indies, members of the Executive Committee and of the staff of the College were entertained to tea by Dr. H. Martin Leake on Wednesday, January 13th, 1926; afterwards proceeding to the New College Building.

Mr. Roberts and Captain Evans were unable to attend, as the former had not returned from British Guiana and the latter had not yet joined the Delegation in the West Indies, being due to arrive in Trinidad from England by the s.s. *Cavina* on January 16th.

Mr. N. Munro-Kerr of Glasgow, Scotland, visited the College in December, while in transit from Dutch Guiana where he had been investigating the prospects of cotton development. Mr. Munro-Kerr was much interested in the College and the Cotton Research Station.

Professor F. Hardy, with Mrs. Hardy and child, returned from six months leave in England by the s.s. *Carare* on January 2nd. Professor Hardy spent the Michaelmas term at Cambridge, where he was engaged in special work in the Cambridge University School of Agriculture.

Dr. C. L. Withycombe, left Trinidad on December 20th, on a visit to British Guiana, returning on December 30th, in connection with the investigations into the Froghopper pest of sugar-cane which is being undertaken in Trinidad by a Committee jointly financed by the Government and Sugar Planters.

Professor S. C. Harland arrived in England on December 17th, after having spent six months touring the Far East in connection with the investigations of the Banana Committee. Dr. Harland is expected to return to Trinidad early in 1926 to resume his work in the teaching of Genetics.

Professor S. F. Ashby left Trinidad on December 12th, on a visit to St. Kitts in connection with the Gummosis disease of sugar-cane which has made its appearance in that island. Professor Ashby took the opportunity, in passing, to visit the banana cultivations in St. Lucia, and lime cultivations in Dominica, where he has on previous visits investigated the Panama disease of bananas and withertip of limes. Professor Ashby returned on January 1st.

The old building will continue to house the Departments of Chemistry and Physics, the Sugar Technology Laboratory, the Tropical Sanitation and Hygiene, the Technical assistants, offices and stores. The rooms vacated by removals into the new building will afford space for expansion, especially in Chemistry and Physics, and the development of laboratories for the technology in other crops than sugar, as equipment becomes available.

Dr. G. Wilbrink, "plantkundigi" to the Cheribon Sub-division of the Experiment Station for the Java Sugar Industry, very well known to plant pathologists interested in sugar-cane for her excellent investigations on the so-called Gum Disease and on Mosaic, recently visited the College. Dr. Wilbrink is on an extended visit to tropical countries, involving a trip round the world. She has visited Dutch and British Guiana, and from Trinidad has proceeded to Barbados, after which, the return journey to Java will include visits to the United States and Hawaii.

The New College Building has been taken over from the Contractors and is now being occupied. The ground floor is taken up with the offices of the Principal, the Registrar and the clerical staff, and the Departments of Agronomy and Mycology, and in addition to the Main Hall there is a large lecture room not allocated, available for all departments as occasion may require. The Mezzanine floor contains a Staff Reading room, with lavatories, a photographic dark room and store room. The first floor houses the Library and Reading room, and the Staff of *Tropical Agriculture* and the Departments of Botany, Entomology and Economics, and there is a retiring room for Women Staff and Students with lavatories. The building is at present without gas or electric light. The new Mansfield Gas plant being erected at the College Sugar Factory is nearly completed and this will supply gas to both buildings. Arrangements for the electric lighting are not quite completed, but it is expected this will soon be done.

The Editor will be pleased to send a gratuitous specimen copy of *Tropical Agriculture*, post free, to anyone interested in tropical development.

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR.—While the low levels for sugar continue in the spot market, prices for delivery in the half of 1926 are notably above spot. The new Cuban crop is estimated at 5,374,000 tons by Guma while Himely's estimate is 81,000 tons lower. Prices on December 16th included, Cubes 32*s.* 6*d.*, Best Granulated 27*s.* 6*d.*, West Indian Crystallized 25*s.*, and Muscovado 21*s.* 3*d.* each per cwt., duty paid.

COTTON.—During the first fortnight of December prices declined steadily to 9·80*d.* per lb. for Mid-American and even touched 9·55*d.*, but from that point some natural reaction has caused advance. Business continues to be dull, hedge selling being the steadiest feature. Lower price levels are anticipated in England, owing to the belief that the crop is larger than the Bureau estimate and that the large proportion of the lower grades is exaggerated. The crop is expected to be 2,000,000 bales larger than last season and the bearishness of the market is accentuated by the large crops of outside growths. Mid-American closed at 9·74*d.* on December 17th.

COCOA.—Prices in general have declined since our last report and rather better sales are reported in consequence. While Trinidad and Grenada cocoas are not quotably lower, they are difficult to place at current quotations. Sales on December 16th included good Ceylon at 102*s.* 6*d.*, Bahia fine at 55*s.*, Guayaquil at 75*s.*, and Accra at 37*s.* 6*d.*, each per cwt.

COFFEE.—Prices declined further towards the end of November, but during December, Indian coffee was in better request, realising 140*s.* per cwt. on December 16th for a good Middling. Kenya also rose, being 116*s.* on December 2nd and 130*s.* on December 16th. Costa Rica Middling realised 150*s.* and Brazil Santos 98*s.*

TEA.—The trade in the finer teas has not been so satisfactory as that in the medium qualities. Ceylon averaged 22·72*d.*, Indian rose to 20·65*d.* and Java to 17·11*d.* each per lb. on December 16th.

RUBBER.—An official announcement issued by the Colonial Office to the effect that on February 1st a release of 15 per cent. would take the place of the 10 per cent. which would have been made automatically under the Restriction Scheme, caused a somewhat violent set-back in prices, from which the market quickly recovered. Forward positions show practically no change. Spot prices rose ½*d.*, per lb. owing to the insistent demand for actual prompt delivery, and the shortage of standard grades on the spot. Since the additional 15 per cent. will bring the Exportable Quota on February 1st to 100 per cent., future increases will only arise through a revision of "Standard Production" which will take place on November 1st of each year. Apparently it is the intention to continue the Scheme. British Tyre Manufacturers announced a future increase of 20 per cent. in price following the increases of 10 per cent. in May and 15 per cent. in August. It appears that manufacturers regard higher prices as of a more or less permanent nature. First Crêpe Spot realised 4*s.* 7¾*d.* per lb. on December 9th and Ribbed Smoked Sheet 4*s.* 7½*d.* to 4*s.* 8*d.* Stocks in London on December 5th amounted to 3,831 tons.

SISAL AND HEMP.—Sisal has risen slightly to 45*s.* per cwt. and retains its value. Manila Hemp which rose from 41*s.* 6*d.* on November 11th to 44*s.* on December 9th afterwards fell to 43*s.* on December 16th.

COPRA.—Copra experienced a steady rise during November and in general the enhanced prices were well maintained during the opening week of December. F. A. Q. Ceylon to London reached £31 7*s.* 6*d.*, Sun-Dried Straits to Rotterdam £30 10*s.*, while Straits to Marseilles declined to £29 10*s.*, each per ton on December 16th.

GROUND-NUTS.—Nigerian new ground-nuts at £21 17*s.* 6*d.* per ton are the main feature of the market. Senegal nuts are not on current offer and quotations are nominal. Chinese nuts can be obtained at £22 10*s.* and Indian at £21.

PALM KERNELS.—Sales of palm kernels on spot have been unimportant. Sales for January shipment direct to England at £21 10*s.* have been quite fair.

PALM OIL.

PALM oil has been put to a great diversity of uses in the past century and a half, since its first importation into Europe on a commercial scale.

In connection with transport, it first came into demand as a lubricant for locomotives, its latest application in connection with transport is as a source of fuel. It is reported that by means of a catalytic process in which zinc chloride is the reagent used, one ton of palm oil has yielded 98 kilos of glycerine and 630 kilos of petrol. On distillation, the petrol yielded 15 per cent. petrol, 25 per cent. illuminating oil and 60 per cent. heavier oils.

Although the cost of recovering petrol from palm oil is at present too costly, it is believed that improvements in method may, in the near future, make it possible to use palm oil as a source of motor fuel on an economic basis.

It is unnecessary to emphasize that such a source of fuel would be of the greatest assistance in developing transport in all countries where the oil palm flourishes, and especially in localities remote from the sources of supply of the mineral oils.—*The African World.*